Mako Total Knee 2.0
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Clinical summary

Title	**What is the best way to identify the transepicondylar axis for femoral component rotation?**
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Reference	Poster Presentation 0855. Presented at: Orthopaedic Research Society Annual meeting; Feb 10-14, 2023; Dallas, Texas.
Objectives	To compare the variation between identification of the medial epicondyle (ME), lateral epicondyle (LE) and TEA measurements done intraoperatively (i.e. manually) and preoperatively using CT scans
Design	Cadaveric
Duration	NA
Key points	**Methods:** • Three high-volume, fellowship-trained surgeons with RATKA experience, manually identified the ME and LE in six cadaveric knees and their relative CT scans utilizing a robotic system to capture the data. • Each surgeon identified the ME and LE on each cadaver ten times while rotating between cadavers for randomization. • For CT identification, each surgeon identified the ME and LE on each CT model two times while rotation between scans for randomization. • For each identification, coordinate points from the CT robotic system were collected and used to measure TEA angle. • Inter-observer measurement reliability was calculated for each ME and LE coordinate by computing interclass correlation coefficient (ICC). **Results:** • The TEA angle variation for manual intra-operative (3.9±2.5°) and CT (2.8±1.7°) identification was statistically significant (p=0.001). • For manual intraoperative identification, the inter-observer ICC for the ME and LE coordinates were excellent in the inferior/superior and the medial/lateral plane (0.82–0.99), but poor for the ME in the anterior/posterior plane (0.33). • The inter-observer ICC for CT identification of the ME and LE coordinates were excellent (0.85–0.99) for all values. **Conclusion:** "Greater reliability of landmark identification was observed for the z-coordinate in the anterior/posterior direction when using the CT scan, indicating that using CT based images may better identify the axis often used to set femoral component rotation, as compared to manual identification"

Limitations	• The data in this study is derived from a cadaveric lab. As such, the findings may not reflect clinical practice.
Discussion	**Why was this study carried out?** • When using technology that assists in TKAs, landmark and bony registration are potential sources of inaccuracy. • Image-free navigation/systems identify the landmarks intraoperatively, which is a potential source of inaccuracy. • For others, such as Mako, the landmarks are identified on a preoperative CT scan and not during registration. • This study was carried out to attempt to understand the differences between these two methods. **What are the potential differences?** • Intraoperative manual identification of landmarks was found to be less reliable for the medial epicondyle in the anterior/posterior plane. • This means that the reference coordinate frame, which gives users information about femoral rotation, may not be accurate. • Though the absolute differences were small at 3.9° (±2.5) for manual vs 2.8° (±1.7) for CT, the variation in the manual points was high, which is reflected by the reliability finding (ICC = 0.33). • This shows, that in this study, the surgeons were not able to precisely identify the medial epicondyle repeatably when capturing manually. **Why is this study important?** • Robotic systems rely on accurate landmark identification to give the user important information about the position of bone cuts and implant positions with reference to the coordinate frame (i.e. where these things are in space). • Image-free systems have the potential to introduce inaccuracy because the coordinate frame may itself be inaccurate. Feeding inaccurate information may enable the user to navigate to an inaccurate model.
References	NA

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